Communicating Reproductive Science to a Doubtful World

_Education Strategies in Oncofertility_

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Chief, Division of Fertility Preservation
Director, Women’s Health Research Institute
Director, Oncofertility Consortium
Northwestern University
Feinberg School of Medicine
Chicago, IL
Mind the Gap!

Reproductive Health = Lifetime of Health
Colliding Epidemics
Silent Killers
Pressure on the Health Care System
Uneven Distribution of Care
Science Knowledge Gap Impacts Health and Decisioning
Hypothesis

Advances in twenty-first century medicine requires well-trained basic scientists and clinical investigators who study reproductive science and medicine in partnership with a well-informed public.

Investment in the education of the next generation of innovators will improve the health of our globe.
Our Tactics

Priming the Pump - Getting Started

Teaching the Teachers - Scaling

Teaching Ourselves - Sustaining
Reproductive health education resources across the entire life spectrum.
CHILDREN
A New You, That’s Who

"Anatomy"

"Menstruation"

"Puberty"

Eric Patrick, Ellen Wartella, Team of Undergraduates
Live Action Introduction from Teresa

“She provides interesting context for it. I like that she’s real. [The intro provides nice] context so kids know at least to regard in higher attention what they’re about to see. That sometimes helps to hear from [someone] official before you dive into the information, especially if you’re going to transition into cartoons.”

~ Mother of a 6th grade boy
Transitional Animation
SUMMATIVE EVALUATION
Method

• $n = 50$ children in Evanston & Skokie
  – 52% in 5$^{th}$ grade; 48% in 6$^{th}$ grade
  – 40% Female

• Children screened either the videos we created (Treatment) or a set of videos on the scientific method (Control)
Develop Measure of Reproductive Health Knowledge

• Researchers created a list of all facts/information from the videos
• \( N = 15 \) undergraduate students sorted facts into essential and non-essential
• Researchers developed a list of 21 multiple choice questions covering essential information

(Collins, 1983)
Sample Item

Where in the **woman** does a baby grow?

a. In the vagina
b. In the uterus
c. In the stomach
Sample Item

Where in the woman does a baby grow?

a. In the vagina – 8%
b. In the uterus – 65%
c. In the stomach – 27%
**Sample Item**

Where in the **woman** does a baby grow?

<table>
<thead>
<tr>
<th>Location</th>
<th>Treatment</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the vagina</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>In the uterus</td>
<td>76%</td>
<td>54%</td>
</tr>
<tr>
<td>In the stomach</td>
<td>16%</td>
<td>38%</td>
</tr>
</tbody>
</table>
Preliminary Results: Learning

- The videos were very effective:
  - \( p < .001 \)
  - Cohen’s d = 1.46
- Results are robust across child gender and age
Preliminary Results:

Appeal

• “I wish we got something like that in school. It’s really informative.” ~ 6th grade boy

• “It’s so good! I think that’s excellent. The singing is really good.”
  ~ Mother of a 6th grade boy

• “They were funny.” ~ 5th grade girl

• “They’re pretty catchy. I liked them a lot.” ~ 6th grade girl
Future Analyses

• Do results vary by children’s...?
  – Attitudes towards the video
  – Prior knowledge
  – Level of pubertal development
    (as rated by parents)
  – Cognitive skills (verbal memory and fluency)
HIGH SCHOOL STUDENTS AND TEACHERS
Biotechnology Professional Development Series

Advancing Biotechnology Education in Chicago

NORTHWESTERN UNIVERSITY
Office of STEM Education Partnerships

LINDBLOM MATH & SCIENCE ACADEMY
BIOTECHNOLOGY CENTER OF EXCELLENCE

science@work
Expanding Minds with Real-World Science

GLOBAL ONCOFERTILITY NETWORK
www.oncofertility.northwestern.edu

NATIONAL PHYSICIANS COOPERATIVE
• Use oncofertility concepts and biotechnology skills to teach high school biology, also for advanced electives

• Developed in partnership with The Woodruff Lab, Feinberg School of Medicine

• Lab activities teach basic science through the context of cancer biology, reproductive biology, and oncofertility

1. Biomaterials Lab: Just Bead It
2. Male Hormone Lab: You’ve Got MALE
3. Female Hormone Lab: 28 Days Later
4. SRY Gene Lab: WhY Are We Different?
5. Sea Urchin Lab: IVF, toxicity, cryopreservation (in development)
Biotechnology Professional Development Series

• 4 Opportunities for Teachers
  1. Biotech Symposium
  2. Survey of Biotechnology
  3. NUBIO
  4. Research Experiences for Teachers
• Baxter Boxes and Loaner Kits
• New Elective Course at LMSA
• 2014: 116 Teachers from 87 Schools
Teacher Reactions
NU Biology Investigations in Oncofertility
What makes NUBIO unique?

- Basic science concepts taught through the motivating contexts of cancer, reproduction and oncofertility

- Inquiry-based and hands-on activities drive a “need to know” resulting in better motivation, retention, and application

- Connection to real researchers working on “bench to bedside” clinical problems

NIH R25 Award # RL5CA133836
Achieving Scalability and Sustainability Through Partnerships

• Biotechnology Center of Excellence at Lindblom Math and Science Academy

• Baxter International’s Science@Work Program

• A Model for Scalability and Sustainability
Scalability: Years Since Program Inception

NUBIO

<table>
<thead>
<tr>
<th>Elapsed Years</th>
<th>Cumulative Students</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>600</td>
</tr>
<tr>
<td>2</td>
<td>1160</td>
</tr>
<tr>
<td>3</td>
<td>3370</td>
</tr>
<tr>
<td>4</td>
<td>6855</td>
</tr>
<tr>
<td>5</td>
<td>11785</td>
</tr>
<tr>
<td>6</td>
<td>18160</td>
</tr>
</tbody>
</table>
Oncofertility Saturday Academy

https://www.youtube.com/watch?v=GCiN2KZqpUc
Goals for High School Girls:

- Hands-on laboratory and clinical activities.
- Prepare for college and careers.
- Develop relationships with scientists, doctors and other professionals.
- Be empowered with women's health knowledge.

Goals for Parents/Guardians of the High School Girls:

- Develop skills to support their daughter's interest in science and medicine.
Goals for High School Science Teachers and Staff:

- Engage in laboratory and clinical activities.
- Develop curriculum and link to the classroom work.
- Reconnect with the love of and reason for teaching.
- Create a network of science teachers.

Goals for Community (CPS and beyond):

- Create biology curriculum that is relevant, skill and intellectually-based.
- Provide continuous engagement beyond the high school diploma.
Meet Our Teachers

Megan Faurot, MEd

Ericka Senegar-Mitchell, Ph.D.
OSA Program Components

• Two-Year Model
  – JOSA, 11th grade students
  – SOSA, 12th grade students
• Student Selection Process
• Informational Meeting
• Modules
  – After School Workshop
  – Saturday Sessions
• Group Projects
• Graduation
OSA Modules

JOSA – Basic Science
• Module 1: Regulation of Ovarian Function
• Module 2: Gene Expression in the Ovary
• Module 3: Fertilization and Beyond

SOSA – Clinical Medicine
• Module 4: Oncofertility and Surgery
• Module 5: Eggs and Sperm, Oh My!
• Module 6: Doctors for a Day

POSA – Parental Involvement
• Module 7: Supporting the Next
• Generation of Women Leaders in Science and Medicine
Program Guiding Question

How can we *preserve* the fertility of cancer patients?

What is bioengineering?

\[ \beta-D\text{-Mannuronic acid} \quad \alpha-L\text{-Guluronic acid} \]
What are the **ethics** of biomedical research?

- Legal concerns
- Religious constraints
- Ethics discussion
OSA IMPACT

Once an OSA Sister, always an OSA Sister!

“OSA has given me so much motivation and inspiration to become a doctor. It gave me the insight that I needed to be sure that I wanted to become a doctor.”

Antavia

SOSA Sisters

JOSA Sisters
Family OSA: Supporting Future Female Scientists, Clinicians and Leaders

- Laboratory Workshop
- Clinical Workshop
- Academic and Career Workshop
- Open forum and evaluation

“This parent workshop was very helpful. I feel more prepared to support my child in making decisions about her future goal of becoming a scientist.” OSA Father
The Beyond

Women's Health Science Program for High School Girls and Beyond (WHSP)

Student Profile

As a selected participant of a WHSP academy, you have become part of a network of young women who have two commonalities—an interest in science and a drive to be successful. The purpose of this student profile is to share academic- and career-focused information about yourself to the science community. The information you post to your profile will be accessible to other student participants, scientists, clinicians, other professionals and undergraduates/graduate students who have an active role in this program; therefore, it is important that you make this a professional profile. You will be encouraged to update this profile with new information throughout your academic and career trajectory.

My Story

Suggested ideas and questions to answer:
Tell us your story.
- What interests you about science, medicine, and/or other areas of study?
- Why did you apply to a WHSP academy?
- What have I learned and/or hope to learn from participating in a WHSP academy?
- What hobbies, groups, teams, and/or extracurricular activities do you participate in and enjoy spending your time doing?

Academic Goals

Suggested ideas and questions to answer:
- Describe your academic accomplishments.
- Describe your high school academic goals.
- Describe the major(s) you are considering to pursue in college.
- What colleges are you going to apply to?
- Are you considering going to graduate school after college? If so, describe what you want to study at the graduate level.
- Describe the reason(s), person(s) and/or an experience(s) that inspired you to consider these academic goals.

Career Goals

Suggested ideas and questions to answer:
- Describe the career(s) you are considering.
- Explain why you are interested in this career.
- Describe the reason(s), person(s) and/or an experience(s) that inspired you to consider this career.
- What do you hope to accomplish in this career?

Resume

Upload resume

Modules Completed

This will be completed by program manager/director

The Oncofertility Consortium
www.on cofertility.northwestern.edu

GLOBAL ONCOFERTILITY NETWORK
“OSA instilled a sense of confidence in me, because women are often discouraged when it comes to pursuing careers in science,” Eldigair said. “In Sudan, science is really a man’s world. I want the girls there to know if they are interested in science that their gender really doesn’t define their success.”

– Fatima Eldigair, OSA 2015
Students learning about reproductive science around the nation!

West Coast

Chicago Area

> 1300 students!

> 1300 students!
Oncofertility National Science Education Network: ONSEN Partnership
COLLEGE
Introduction to Reproduction
Course starts September 2015

About this Course
Do you have questions about sex hormones or menstrual cycles? This is a crash-course in human reproductive health through fact and biology-based information on a variety of topics. We will cover reproductive anatomy, key biological changes during puberty, sexual biology and contraceptive methods, reproductive disorders, and a special introduction to the exciting field of Oncorefertility. Specific lecture titles are as follows: 1) Reproductive Anatomy & Hormones, 2) Menstrual Cycle, Oocyte Maturation, & Sperm Activation, 3) Sexual Biology, Fertilization, & Contraception, and 4) Reproductive Health & Disorders.

The objective of this course is to ensure you understand reproductive health and not confuse reproduction with sex (or having sex). This course was designed with you in mind, and is aimed at providing you with quality information that is meaningful to you and that may be hard to find otherwise. Reproductive health is an area of knowledge that needs to be demystified. We have designed this course for you to examine reproduction through a biological and scientific lens addressing these issues in a comfortable and interactive format that will lead to a better understanding of holistic health, long-term.

Subtitles available in English
1-3 hours/week
INTRODUCTION to REPRODUCTION

Lecture 1.2
Reproductive Hormones

Teresa Woodruff
Director, Center for Reproductive Sciences at Northwestern University
Master of Science
Reproductive Science and Medicine

A Degree Program Focusing on Human Reproductive Health

• Complete foundation and advanced topics courses
• Train with clinical, basic, and translational science leaders
• Engage in the Center for Reproductive Science

For information and application: www.tgs.northwestern.edu/admission
Application deadlines: January 20, 2017 and May 15, 2017

INQUIRIES:
Elizabeth Sefton, PhD
Director of Graduate Studies
Repro-masters@northwestern.edu
PUBLIC
Create a reproductive-focused lexicon to provide the lay public with words they can use to understand reproductive health and biology.
Our Goal

Provide **authoritative** and **comprehensible** source of information from reproductive scientists and clinicians
How can you use Repropedia?

Contribute
- Suggest a term and/or definition
- Provide an original photo or diagram from your research
- Volunteer to record a video definition

Educate
- Use it as an educational reference for your students
- Ask peers, students and trainees to contribute

Share
- Subscribe to API so that reproductive health definitions will automatically link to your website (repropedia.org/api/subscribe)
- Spread the word amongst your community
Ask an Expert

Do you have a question about a Repropecia term that you wish to have answered by a scientist or clinician? Ask an expert here. One of our board members will get back to you within the week.

Name *

Email *

Phone

Term *

Question *
PATIENTS
Información para los Padres: Oncofertilidad Ahora

¿Qué es Oncofertilidad?
¿Qué es el Consorcio Oncofertilidad?
¿Cómo va la fertilidad de mi hijo ser afectada por el cáncer?
¿Qué es la normal fertilidad feminina, y cómo es afectado por el tratamiento del cáncer?
¿Qué es la fertilidad masculina normal, y cómo es afectado por el tratamiento del cáncer?
¿Qué es la proyecto actual del Consorcio Oncofertilidad?
Crio preservación de tejido ovárico - Preguntas a tener en cuenta

Sugiera una pregunta

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Para preguntas acerca de sus opciones de preservación de la fertilidad llame al 866-706-FERT(3378)
Fellow Education Day

Oncofertility Consortium
November 2016
Fellow Education Day

• 10th Annual Oncofertility Consortium Conference: 
  *Expanding Access to Emerging and Existing Oncofertility Services*
  – November 1-3, 2016, Chicago, IL
• One day multidisciplinary course prior to meeting
• Didactic presentations
• Complex clinical cases reviewed in interdisciplinary teams
• Targeting fellows in REI, male fertility, and oncology

• Society for Reproductive Endocrinology and Infertility (SREI) travel awards
  – First 5-7 REI fellows to register
  – Maximum reimbursement $1000 per fellow
Learning objectives

At the conclusion of this course, participants should be able to:

• Describe currently available options for female and male fertility preservation including recent advances in embryo, oocyte, ovarian tissue, sperm, and testicular tissue cryopreservation.

• Formulate individualized treatment plans for patients throughout the reproductive spectrum who are interested in undergoing fertility preservation through cross-discipline collaboration.

• Appreciate the interdisciplinary approach necessary to achieve effective fertility preservation and survivorship care.
## Course structure

<table>
<thead>
<tr>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fertility Preservation in the Pediatric Population</strong></td>
<td>Jill Ginsberg, MD – Pediatric Oncologist and Director of the Cancer Survivorship Program, Children’s Hospital of Philadelphia (CHOP) Cancer Center</td>
</tr>
<tr>
<td><strong>Fertility Preservation in the Male</strong></td>
<td>Jim Smith, MD, MS – Urologist and Director of Male Reproductive Health, University of California, San Francisco (UCSF)</td>
</tr>
<tr>
<td><strong>Team based learning: Pre-pubertal girl and adult male</strong></td>
<td>Divya Shah, MD, MME – Reproductive Endocrinologist, University of Pennsylvania&lt;br&gt;Wendy Vitek, MD – Reproductive Endocrinologist and Director of Fertility Preservation, University of Rochester</td>
</tr>
<tr>
<td><strong>Advances in Fertility Preservation</strong></td>
<td>Teresa Woodruff, PhD – Director Women’s Health Research Institute, Chief, Division of Obstetrics and Gynecology-Fertility Preservation</td>
</tr>
<tr>
<td><strong>Survivorship</strong></td>
<td>Laxmi Kondapalli, MD, MSCE – Reproductive Endocrinologist and Infertility Specialist, Colorado Center for Reproductive Medicine</td>
</tr>
<tr>
<td><strong>Team based learning: Early and late reproductive female</strong></td>
<td>Divya Shah, MD, MME – Reproductive Endocrinologist and Infertility Specialist, University of Pennsylvania&lt;br&gt;Wendy Vitek, MD – Reproductive Endocrinologist and Infertility Specialist, Director of Fertility Preservation, University of Rochester</td>
</tr>
</tbody>
</table>
Adult learning

The course will be comprised of didactic lectures given by leaders in the field interspersed with complex clinical cases that will be reviewed in interdisciplinary teams.

Participants will be provided supplementary materials for review prior to course attendance in order to facilitate an interactive “flipped classroom” approach to team based learning.
Course participants

- 36 registered participants
- Multi-disciplinary group
- Varied levels of training

- 83% found course structure extremely effective
- 78% felt preliminary readings contributed positively to learning
- 100% felt the depth of both lectures and cases was appropriate
Multi-disciplinary group

- Pediatric Gynecology
- Pediatric Oncology
- Reproductive Urology
- Maternal-fetal medicine
- Majority REI
Varied levels of training

- Medical students
- Nurses
- Residents
- Attending physicians
- Majority fellows
Quite simply, this seminar was superb. My congratulations and appreciation to the organizers. As an REI with 25 years experience, I can say without reservation that I learned a lot. Although designed (and very appropriate) for fellow education, I think this seminar was also perfect for those in my shoes – experienced practitioners that wish to become grounded in concepts related to oncofertility and fertility preservation. I would not change a thing. The mix of lectures and cases was perfect for me. Also, the placement of this seminar before the bulk of the conference helped me tremendously in my awareness during the next two days of presentations. In addition, I greatly enjoyed interfacing with fellows and their fresh up-to-date thinking! I cannot say enough positive or send enough praise! Kudos and thank you to all!
Mobile Compatibility
Welcome to SaveMyFertility.org

SaveMyFertility.org is an authoritative resource for adult cancer patients and the parents of children with cancer who want to learn more about preserving their fertility before and during cancer treatment, and protecting their hormonal health after treatment. SaveMyFertility.org also provides information and guidance to oncologists, endocrinologists, and other health care providers concerned with the reproductive health of cancer patients and survivors.

Provider Pocket Guides
- Fertility Preservation for Children Diagnosed with Cancer
- Fertility Preservation for Men Diagnosed with Cancer
- Fertility Preservation for Women Diagnosed with Cancer

Patient Fact Sheets
- Children and Cancer: Protecting Your Child’s Fertility and Healthy Puberty
- Men and Cancer: Preserving Fertility and Managing Hormonal Symptoms
- Women and Cancer: Preserving Fertility
- Women and Cancer: Managing Hormonal Symptoms
Outreach

Reaching key constituents regularly

- Monthly Newsletters
- Virtual Grand Rounds
- Visiting Scholars
- Website
- Blogs
- Updated SaveMyFertility brochures
French translations now available
February 10, 2017 by Lauren Ataman-Milhouse

Colleagues in Tunisia at the Aïza Othmana ART Center of Tunis completed translating the SaveMyFertility materials into French. This work was completed by Fatma Douïk, Khadja Berekheb Kacem, and Marouen Braham under the direction of Mohamed Khrouf (pictured). We thank them for their hard work and appreciate their efforts to make oncofertility materials accessible to patients in their native language.

Oncofertility materials are now available in the following languages:

- English
- Portuguese (Português)
- Japanese (日本語)
- Turkish (Türkçe)
- Spanish (Español)
- Korean (한국어)
- French (Français)

Use the resource browser to explore these pages throughout the website. All of the French translations can be found here or by using the language search function in the website.

If you wish to provide translations in your native language, please contact Lauren Ataman-Milhouse, who directs the efforts of the Global Partners Network.

Categories: Global Partner
Tags: french, tunisia, mohamed khrouf
Advances in twenty-first century medicine requires well-trained basic scientists and clinical investigators who study reproductive science and medicine in partnership with a well-informed public.

Investment in the education of the next generation of innovators will improve the health of our globe.
Thank you!